

REMARKS

The Office Action may be characterized as follows:

1. Original Claims 5 through 10 and 13 have been cancelled. Claims 1 through 4, 11, 12, and 14 through 18 have incorrectly - by Mr. Patel - been indicated as withdrawn pending allowance of a generic claim. New claim 30 submitted by the last amendment is a dependent apparatus claim relating back to apparatus claim 27. Claim 30 should not be grouped with the asserted "withdrawn claims".

2. Claims 26 through 29 and 31 through 35 were rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as invention.

3. Claims 26 through 29 and 31 through 35 were rejected under 35 USC §103(a) as being unpatentable over Switlik '059 in view of Wheeler '837.

4. Claims 26 and 27 were questioned. The Examiner asserted that:

It is not clear between claim 26 and claim 27 whether applicant is claiming three or four boattails. (Emphasis Added.)

The above-noted bases for the rejection and/or objections are respectfully traversed.

Basford first discloses that fluid dynamic base drag is greatly reduced by his non-obvious aerodynamic features based upon a combination of vortex generators and shortened boattail plates not suggested in any known art.

Taking first the last rejection (summarized as number 4, above). Applicant has never claimed boattails. The Examiner's question refers to the number of "boattails" of claims 26 and 27. It is highly instructive that Examiner Patel still fails to

appreciate the difference between "boattails" and "boattail plates" as described and claimed by Basford.

Mr. Basford clearly specified the distinct differences between Boattails and Boattail Plates in his specification and original claims. (Mr. Basford's original claims 5 through 18 claimed "boattail plates".) Headings in the specification were provided by Mr. Basford in order to assist the reader. Thus, Mr. Basford has a heading entitled Boattails commencing at page 7, line 1, and clearly describes them and their drawbacks continuing unto page 8, line 20.

It is there stated in part under Full Boattails:

Therefore the primary drawback of full boattails is that the maximum drag reduction requires extreme length, often three to four times the width of the bluff body, making full boattails impractical for highway vehicles.

x x x x

[F]ull boattails terminating in a point or narrow edge are rarely used.

At another heading at page 9, line 23, Basford set forth Boattail Plates and devotes over two pages to the development of such structure. The two categories of methods and devices are simply not the same. Mr. Patel is either seriously mistaken or has simply glossed over the technology for reasons known only to him. In either event the Applicant is being harmed.

At this point Mr. Basford - who wrote his own application, and has been in repeated telephone contact with Examiner Patel - has lost faith in the Examiner's capabilities and requests that the Final Rejection be removed and the case transferred to a new Examiner who has familiarity with the aerodynamic factors relating to vortex generators, boattail plates and trailing panels for fluid drag

reduction. To that end another Second Declaration by Mr. Basford is being submitted herewith.

Additionally, claims 26 and 27 are set out below with emphasis added by underlining. Note that claim 26 is a generalized claim for a bluff body moving in a fluid; and, as such specifically states "four boattail plates". Claim 27, being more specific, refers to a land vehicle moving in air with "only three boattail plates". Nothing can be clearer or more specific than these numbers. Claim 26 uses "four" whereas claim 27 uses "three". What part of four (claim 26) or three (claim 27) can be unclear?

Mr. Basford's enclosed Second Declaration sets forth the technical and legal basis for removal of Examiner Patel from further examination of this case. Because he was prosecuting his own Application, Mr. Basford took great care concerning the content of his telephone conferences with Examiner Patel. While it would unduly lengthen this amendment to review all of the current Second Declaration content, it is believed instructive to look at some of the pertinent material in Mr. Basford's enclosed Declaration. The enclosed Declaration is being presented under Rule 131 and relative to a Petition for a new Examination, change of Examiners and removal of the Final Rejection which both Attorney Stan Jones and Mr. Basford believe has been done prematurely and without sufficient consideration.

Mr. Basford states under oath, in part, as follows:

... Examiner Patel apparently has little or no working knowledge of patent practice and case law regarding so called combination patents. During his first phone call to the applicant during the summer of 2002, Examiner Patel clearly stated that a patent could not be allowed if either of the component methods or devices for base drag reduction was previously known. In a second phone call the next day he stated that one of the component methods or devices could be previously known but that the other must be new. Later, he stated that both of the components could be previously known, but that at least one must be changed in some way.

Because of the apparent simplicity of my invention, I had previously researched this issue of combination patents to make sure that I had a patentable invention, before spending the time to prepare two Provisional Patent Applications and a Regular Patent Application for this invention. Therefore, I immediately recognized that all three of Examiner Patel's statements were contradicted by descriptions of combination patents in other readily available sources, and that each of his three statements conflicted with the other two.

For example, in the book "Patent it Yourself" by David Pressman (Nolo.com, Seventh Edition, February 2000), on page 5-18, at the bottom of column one, under the heading "Secondary Factors in Determining Unobviousness of Combination Inventions" we find the following statement:

Inventions that combine two or more elements known in the prior art can still be held patentable, provided that the combination can be considered unobvious - that is, it's a new combination and it produces new and unexpected results.

The author then went on for another two full pages to discuss nine secondary factors in determining non-obviousness.

In another example, a quick internet search on Google turned up the following statement on the web site of IP attorneys Bowie and Jensen, LLC, of Towson, MD.

A combination patent is an invention that uses two or more previously well known elements and combines them to form a new product or device.

(Please see "<http://www.bowie-jensen.com/>")

In still another example, on another web site we find the statement:

The Supreme Court has used the term 'combination patent' to describe a patent for an invention whose novelty lies in a new combination of known elements. Thus, it is the interrelationship of the known components that is the subject of the patent.

(Please see "<http://www.biojudiciary.org/subpage1.asp?tid=158>")

Furthermore, although Examiner Patel's three statements clearly conflicted with each other, at no time did he acknowledge the differences between his three statements, or even acknowledge that he had made the prior contradictory statements. Therefore, unless we assume that Examiner Patel deliberately made false statements to an

applicant, we are forced to conclude that he lacks sufficient working knowledge of patent practice and case law on combination patents, and is therefore unqualified to examine an application for a combination patent.

3. Because the patentability of the subject invention depends on the definition of a combination patent, this issue alone is sufficient to cause the applicant to lose all confidence in the examiner; but there are more issues and reasons why the Examiner should be changed for an impartial review of my invention. I must conclude that Examiner Patel apparently has little or no working knowledge in the field of the Aerodynamics of Bluff Bodies, and moreover, find that he is unfamiliar with the standard terminology used in this field of art.

In the office actions received from Examiner Patel, he has made several statements which reveal beyond any doubt, that he has little or no knowledge of aerodynamics. For example, in his second Office Action of Sept. 24, 2002, starting on the fifth line from the bottom on page 7, he made the statement:

It is not clear what is claimed as invention because elected Fig. 8 contains a truck body not a bluff body. The truck body has six (sides) flat base surfaces not one.

However, anyone familiar with this art would surely know that a truck body is a bluff body, and that, in terms of aerodynamics, the base surface is always the rearmost surface of the bluff body. In the field of aerodynamics, a bluff body is, by definition, any body where the pressure drag, which includes both forebody drag and afterbody or base drag, is greater than the skin friction drag. By this definition all common highway trucks of the type shown in my specification are bluff bodies.

In a second example, in the second office action, Examiner Patel stated on page 7 that claims 5-18 were rejected as being indefinite, and provided many underlined examples over the next three pages of terminology that he considered vague or indefinite.

But after I hired a patent attorney and with the attorney's help, wrote all new claims, claims 19 through 35, the examiner again stated in the third Office Action that the claims were indefinite. At this point it became evident that the claims are not vague or indefinite, and that the main problem is instead that the examiner is simply not conversant with the standard technical terminology used in the field of the Aerodynamics of Bluff Bodies. Terms such as base drag, base surface, boundary layer, trailing edge, separated shear surface, and

low pressure wake, all have specific meanings that are well recognized, well understood and commonly used by all artisans working in the field of aerodynamic drag reduction.

The claims were carefully written using this standard technical terminology in order to clearly, concisely and unambiguously describe the invention to people of ordinary skill in this art field. In addition, please note that the invention is described in simpler language, for the benefit of persons less familiar with the technical language, in both the brief summary and abstract of the invention.

In a third example, Examiner Patel provided further evidence of his lack of knowledge of aerodynamics during one telephone call in the summer of 2002, when he stated that the patent application should be written so that it could be easily understood by a typical welder. However, the invention does not disclose any advances in the field of welding, and all the parts of the current invention can easily be made without requiring any welding.

Only later did it become apparent that the examiner wanted the invention described in very simple terms, terms that could be understood by a typical high school graduate with no knowledge of aerodynamics, apparently because the examiner himself did not recognize or understand the standard terminology routinely used in the field of aerodynamics.

4. Compounding his lack of knowledge of aerodynamics, Examiner Patel has failed to make use of the technical information provided in the application itself and the technical references submitted with the Invention Disclosure Statement ("IDS"). Applicant went to great lengths to provide the background information needed for readers to understand the application, both in the application itself and the various references that were explained in the specification.

X X X

Also, please note that my referenced citation 11 in the IDS refers to complete chapters from the book "Fluid-dynamic Drag" by Sighard Hoerner, which book is still considered by many to be the definitive work on aerodynamic drag, including Chapter 2 on boundary layers, Chapter 3 on pressure drag, including base drag, and Chapter 12 which deals specifically with the aerodynamics of land vehicles. However, Examiner Patel has failed to make use of any of these resources or he would not be asking the questions he has asked.

Because Examiner Patel has insufficient knowledge of the field, and has not made use of the technical information provided by the applicant, it is my opinion that he is unqualified to examine the subject application.

5. Examiner Patel has apparently not made a good faith effort to understand the invention, or comprehend the entire Regular Patent Application of June 8, 2001, applicant's Declaration of March 19, 2003, or the amendment dated 20 March 2003. Only one example need be set forth to illustrate this point.

Near the middle of page 4 in the most recent Office Action of May 27, 2003, Examiner Patel stated:

It is not clear between claim 26 and claim 27 whether applicant is claiming three or four boattails. (Emphasis Added.)

First, please note that Examiner Patel should be using the term "boattail plates" instead of boattails. The two structurally and functionally are much different and the two should not be confused. Second, claim 26 says that four boattail plates are to be used on a bluff body fully immersed in a fluid, while claim 27 says that only three boattail plates are needed on a land vehicle. How could this be made any clearer? It therefore appears that either Examiner Patel has not read the claims carefully, or does not understand the differences or, perhaps, he is being deliberately difficult and disagreeable.

A second example: Please see the examiner's statement on page 11 in the second Office Action of Sept. 24, 2002, where it is stated that "Claims 5-10, 13, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Switlik '059, in view of Wheeler '837."

In response, applicant prepared a declaration which pointed out, among other things, that the boattail plates shown in Figs 1-17 of Switlik '059, clearly fall within the scope of Bilanin '808, and that the only new material claimed in Switlik '059 deals with the manner of folding the boattail plates to make them easier to use.

Nevertheless, in the most recent Office Action of 27 May 2003, Examiner Patel repeats almost word for word his previous rejection, changing only the claim numbers, with the statement; "Claims 26-29, 31-35, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Switlik '059 in view of Wheeler '837."

This obvious word-by-word repetition by Examiner Patel suggests that he has never read applicant's first Declaration of 19 March 2003 which was carefully written, clearly and concisely, to respond to the examiner's mistake in the previous Office Action of Sept. 24, 2002.

6. In his rejection under obviousness, on page 4 of the recent Office Action of May 27, 2003, it appears that Examiner Patel still does not understand the goals and objectives of this invention and of other related disclosures of the prior art.

In his rejection, Examiner Patel stated:

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device, as disclosed by Switlik '059, to include a plurality of vortex generators, as disclosed by Wheeler '837, to achieve the desire level of base drag reduction for the bluff body." (Emphasis Added)

For all inventions intended to reduce the base drag of bluff bodies, including highway vehicles, the desired level of base drag reduction is obviously the maximum possible base drag reduction within legal limitations and other practical constraints such as cost and ease of use. Since the subject invention provides roughly 50% greater base drag reduction than either Bilanin's boattail plates or Wheeler's low drag vortex generators when used alone, while simultaneously reducing the optimum length of the boattail plates by roughly half, it would be obvious to anyone with ordinary skill in the art, that Bilanin, Switlik, or Wheeler, or more probably all three, would have disclosed and claimed this combination in their patent applications, if they had been aware of its far greater benefits. Moreover, if they already knew, or even had any suspicion, that their invention could be used in combination with another known invention to produce far greater benefits, they would have been foolish to not disclose it and claim it.

Furthermore, standard patent practice requires full disclosure by every applicant, so applicants are not allowed to conceal known combinations which would provide greater base drag reduction at lower cost. No such disclosure, claim or suggestion is made in this art.

Since Examiner Patel does not understand the goals or significance of the subject invention, and has ignored attempts by the applicant to clarify these issues, he is unqualified to examine the subject application. Additionally, he refuses to acknowledge or admit

7. Examiner Patel has been very difficult to work with, both to the applicant and to the applicant's patent attorney. For example, because of Examiner Patel's incorrect statements about combination patents, as described in section one above, which changed from one day to the next, the applicant concluded that all further communications should be in writing so that they would be well documented.

In a second example, during one of Examiner Patel's phone calls to the applicant in the summer of 2002, he pressed the applicant to hire a patent attorney, and to send in a complete amendment the very next day, which is clearly unreasonable.

In a third example, in each and every phone call, the examiner has stressed how little time he has for examining applications, and has implied that he was doing the applicant a great favor by looking at the application at all. This attitude is unacceptable. As an applicant, I have described and claimed my invention in as clear and concise terms as possible. Moreover, consistent with the requirement for full disclosure, I have provided information on the most relevant prior art, and all the needed technical background information. And I have paid all the required fees. In return, the examiner should make a good faith effort to fully understand and examine the application.

Claims 26 through 29 and 31 through 35 were rejected based upon an unfounded assertion that they are "indefinite" coupled with the Examiner's challenge to certain quoted phrases used in the claims. Examiner Patel concludes that the claim language used "has failed to particularly point out and distinctly claim the subject matter which applicant regards as the invention." Not so. In Mr. Basford's earlier Declaration dated March 29, 2003 he carefully explained his invention and also defined the terms used to define the novel features of his invention.

The problem may well be that the Examiner is simply unfamiliar with the technical terminology commonly used in the field of aerodynamic drag reduction. For example, terms such as base drag, base surface, boundary layer, trailing edge, separated shear surface, and low pressure wake, all have specific meanings that are well recognized, clearly understood and commonly used by all artisans working in the field of aerodynamic drag reduction. This combination invention is clearly

defined by careful use of such accepted terminology. These facts notwithstanding, Mr. Patel has ignored Mr. Basford's first Declaration and fails even to acknowledge that such a Declaration was submitted.

Not only that, but Mr. Patel has missed the most pertinent art which Mr. Basford has cited and explained at length. Perhaps the closest art relates to apparatus tested by W. A. Mair of Cambridge University, who considered vortex generators in conjunction with full or truncated boattails -- not shortened boattail plates as claimed by Basford. Mair concluded, without testing, that such a combination provided little or no additional drag reduction over the best boattail shapes when used alone. (Please see paragraphs 12 and 16 of the Basford Declaration dated March 19, 2003.) Thus the closest art is neither cited by the Examiner nor mentioned in his Action. Such art clearly teaches away from the invention and is highly probative evidence of the strength and power of the Basford discovery.

In clear contrast to Mair and the other art, Basford teaches moving the rearward edge of shortened boattail plates roughly 50% closer to the rear of the truck. Such a simple step -- by hindsight -- provides both novel and commercially viable savings. Basford's unique edge location (whether boattail plates or a trailing panel of generic claim 35) works to reduce drag whereas the prior art has failed. The Basford structure thus satisfies several significant criteria for a patentable invention.

As a further aid to the Examiner's understanding, please note that Figure 1 of the Basford Application must be taken in consideration with Basford Figure 8. Figure 1 is a schematic plan view of the rear end of a bluff body 20, with an arrow 21 showing the direction of fluid flow. Such flow includes boundary layers 23 which form along the side surfaces 22, and become the separated shear surfaces 26 after passing the trailing edges 24 of the truck body. The flow pattern includes the recirculation bubble - also known as a low pressure wake - which forms behind the base surface 25. Vortex generator arrays 40, cause the separated shear surfaces 26 to turn sharply inward thereby reducing the size of the low pressure wake. Placing a rear edge of the boattail plates 50B (Basford Figure 8) at the outer perimeter of the low pressure wake, provides maximum fluid-dynamic base drag reduction for the truck body 30. This stated positioning of the rear edge in

reduction for the truck body 30. This stated positioning of the rear edge in combination with vortex generators is critical to the Basford invention and is nowhere taught or suggested by the prior art. (Please see paragraphs 7 through 9, 12 and 16 of the first Basford Declaration.)

The above-noted accepted terminology and elements from Basford Figures 1 and 8 will now be applied to, for example, claims 26 and 27 by associating the element numbers from the Basford drawing with the claim terminology.

26. Apparatus for reducing the fluid-dynamic base drag of a bluff body (20) moving through a fluid (21) and creating, at the rear of the body, a low pressure wake having an outer wake perimeter, which bluff body (20) has a substantially flat rear base surface (25), a pair of opposed side surfaces (22A and 22B), and opposed top and bottom surfaces all joined with said rear base surface at side, top and bottom trailing edges (24), respectively, so as to form a box-like container (30), said apparatus comprising:

means positioning side-by-side vortex generators in a linear array (40) ahead of the two side, top and bottom trailing edges (24) of said bluff body (20) for generating counter rotating stream-wise vortices (shown in Figs. 2 and 3 of Wheeler '837) in a fluid boundary layer (23) passing generally along said bluff body and creating from said layer separated shear surfaces (26) which turn sharply inward aft of said trailing edges (24);

four boattail plates (50) inset and affixed a predetermined distance from the top and side trailing edges; and

rear edges on said boattail plates (50) sized to intercept the separated shear surfaces (26) [of said fluid layer] at the outer perimeter of the low pressure wake, thereby providing maximum fluid-dynamic base drag reduction for said body. (Emphasis added.)

27. The apparatus in accordance with claim 26 wherein the bluff body is a land vehicle moving in air, which vehicle has only three boattail plates attached adjacent the top and opposed side trailing edges; and

three linear arrays of vortex generators, one array each associated with one each of said boattail plates. (Emphasis added.)

Mr. Basford has thus discovered that vortex generators, ala the Wheeler disclosure, cause the separated shear surfaces (elements 26, above) to sharply

swing inward just aft of the trailing edges 24 of the bluff body. Basford combines known linear vortex arrays with boattail plates having rear edges placed so as to intercept those separated shear surfaces at the outer perimeter of the inwardly-turned (and smaller) low pressure wake. The location and positioning of these rear edges is much closer to the base surface of the trailer body than Bilanin, or Switlik or any other known art teaches or suggests.

Combining vortex generators and boattail plates is novel over the art. With a truck body moving in air (Claim 27), maximum base drag reduction is achieved when the rear edges of the three shortened boattail plates are positioned in a rearward direction at about 1/6th the width of the truck's rear surface. (Please see Claims 23, 24, and generic claim 35 which set forth that novel dimensional relationship in varying terminology.

Of course - contrary to what Examiner Patel acknowledges - claim 35 is generic to all embodiments of the Basford invention. Likewise, Examiner Patel is flatly wrong when he refuses to allow claims to both method (Claims 19, 20 and 21 - 25) and apparatus (Claims 26 through 35) covering the same Basford embodiment in this one patent application. Reconsideration is respectfully requested. A Notice of Appeal and Formal Petition will, if necessary, be filed on this particular issue among other issues as required.

The art relied upon by the Examiner is Switlik '059 in combination with Wheeler '837. What is lacking in such art is the precise combination of linear arrays of vortex generators in combination with boattail plates, as claimed. Moreover the critical rearward extension length of about 1/6 the width of the base surface (assuming width less than height, as usually is the case) is not suggested by such an art combination. Inventor Basford defines the size of his shortened boattail plates so that the rear edges of such plates intercept the separated shear surfaces at the outer perimeter of the low pressure wake. This novel, and heretofore unknown combination, provides maximum fluid-dynamic base drag reduction for a bluff body. That novel combination constitutes the crux of the Basford invention. One wonders if these aerodynamic improvements can be presented in any clearer terminology. Reconsideration is requested.

It is readily apparent simply from the Switlik patent drawings, that Switlik discloses full length boattail plates as first taught by the Bilanin '808 patent. Please note that Figures 1 and 2 of the Switlik patent show a dimension for the plates 28, 32 of about 36 inches or so. See paragraph 14 of the Basford Declaration. Also it should be noted that Switlik, at column 9, lines 31 through 47, discloses the Bilanin panels, but points his invention in the direction of ease of deployment of such panels. Please see, column 10, lines 34 through 54, etc. Nowhere does Switlik teach or suggest using shortened boattail plates of an extension length of about 12 to 18 inches on a full sized truck body or 1/8th to 1/6 the width of the base surface, as claimed by Basford.

In short summary, what has not been recognized before this novel invention, was that combining the two techniques - vortex generators and shortened boattail plates - would greatly improve base drag reduction provided that the extension length (ie. plate width, per se) of the boattail plates was about 1/6 of the width of the base surface.

Using the truck examples of the specification, the outside width of the rear base surface is about 102 inches, and the inventive 1/6 of 102 inches is about 18 inches. (It is 1/8th, or about 12 inches in Basford Fig. 9, in order to comply with the Department Of Transportation Regulations for trailers built after January, 1998). This Basford improvement is a far cry from the 36 to 40 inches of the prior art, including Bilanin, Switlik and the other references. The Basford invention is clearly novel over such art.

Note that this critical "1/6th the base width feature" (or "1/8th" in Basford Fig. 9) is clearly specified in some of the claims. The first Basford Declaration further sets forth ample reason why the prior art teaches away from this claimed distinction. In particular, the Basford Declaration confirms that independent Claims 19, 20, 26 and 35, for example, define a novel combination over all of the known and cited art.

Likewise, Claim 35 is a generic claim that is clearly allowable over the known art. It reads as follows:

-- 35. Apparatus for reducing to a minimum the fluid-dynamic base drag of a bluff body moving through a fluid passing generally along said bluff body

and creating, at the rear of the body, separated shear surfaces which define a low pressure wake having an outer wake perimeter, which bluff body has a substantially flat rear base surface with given height and width dimensions and a periphery of trailing edges, said apparatus comprising:

vortex generator means mounted adjacent to and forward of said trailing edges for generating counter-rotating stream-wise vortices in said fluid layer, which generators cause the separated shear surfaces to turned sharply inward thereby reducing the size of the low pressure wake, and

edge means coupled to said base surface and inset from said trailing edges for intercepting said separated shear surfaces at the outer perimeter of said low pressure wake, namely, at a distance behind said base surface of about 1/6th to 1/8th of said given height or width dimension, whichever is less. --.

As conceded by the Examiner, the Switlik reference is completely devoid of the Basford vortex generators for creating a smaller low pressure wake, which enables the separated shear surfaces to intercept the rear edges of the shortened boattail plates at a distance of only about 1/6 to 1/8 of the base surface width. Furthermore, nothing in Switlik or Wheeler suggests such a combination.

Only after reading and understanding the Basford specification did the Examiner piece together two non-related patents for his obviousness rejection. What the Examiner has done is use Applicant's own specification against him to his great detriment. That is wholly unfair. Reconsideration is respectfully requested.

The earlier Basford Declaration clearly explains these novel principles in carefully worded terminology defining a new and non-obvious solution to a problem which all prior artisans overlooked. If it were so readily obvious - as the Examiner contends - why is it not shown or suggested by the cited art? Instead, the cited art – Applicant respectfully submits - testifies to the worthiness, merit and novelty of the Basford invention. It clearly does not - as the Examiner contends - negate the claimed novelty.

This amendment is being timely presented within two months immediately following the final rejection. This case is believed to be in condition for passage to the Issuance Branch and such action is requested. Otherwise - should the case be determined not allowable - Applicant and the undersigned hereby request a telephonic interview with Examiner Patel and his supervisor, Mr. Glenn Dayoan

(703) 308 - 3102. The undersigned will call Examiner Patel shortly in order to determine the status of this Application.

If necessary, a Notice of Appeal will be filed, and that Notice will be followed by a formal petition to Remove Examiner Patel from further prosecution in this matter. In any event, this Amendment must be entered to reduce the number of issues on Appeal and to sharpen the clarity of understanding relative to any Formal Petition that may become necessary.

Respectfully submitted,

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